Amino Acids Functionalized MCM-41 synthesized from Rice Husk

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Nowadays, mesoporous silica materials cover a large panel of applications in chemistry, biology and material science (e.g., catalysis, separation, drug delivery). Among them, MCM-41 materials are of great interest as they feature the highest surface area (~1000 m^2/g), regular architecture on the mesoscale with narrow pore size distribution and mesopore diameters adjustable in the range 2-10 nm [1]. In order to reduce the cost of the synthesis and to develop circular economy, MCM-41 can be synthesized using an agricultural waste, i.e., Rice Husk (RH) [2]. RH contains 10-20 wt% silica, 1-3 wt% metallic impurities, 90-80 wt% organics (26 wt% lignine, 50 wt% hemicellulose, cellulose).

Our study focuses on improving the acid leaching of RH and the calcination processes to reach silica materials featuring surface area as high as 300 m^2/g. To achieve this goal, metallic impurities need firstly to be removed by acid leaching to avoid the formation of cristoballite. Otherwise, this material cannot be transformed into MCM-41 due to its low porosity. The resulting silica from RH is then directly functionalized by different amino-acid silanes and simultaneously transformed into MCM-41 *via* pseudomorphic transformation [3] (Fig. 1).

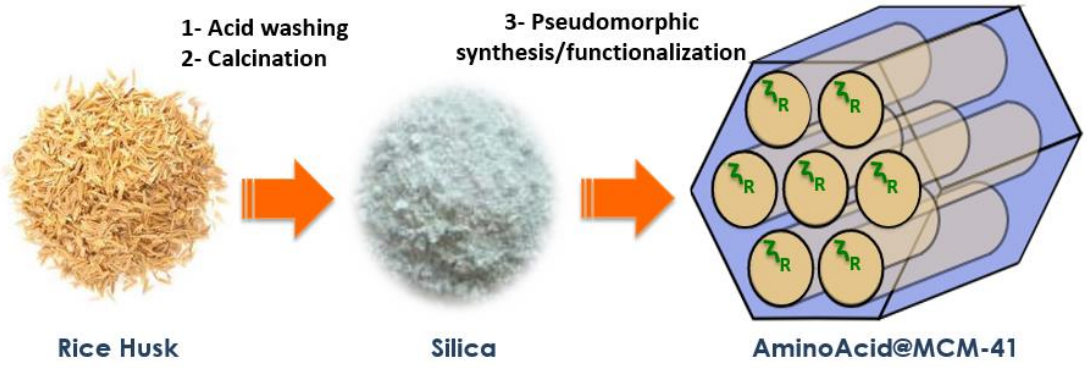

Fig. 1 – Schematic representation of the transformation of Rice Husk into Amino Acids functionalized MCM-41 materials.

References

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[3] A. Galarneau,J. Iapichella, K. Bonhomme, F. Di Renzo, P. Kooyman, O. Terasaki, F. Fajula, *Adv. Funct. Mater* ***2006***, *16*, 1657.